

Claims

- [c1] 1. A filter aid for use in a filtering system for removing metal particles, tramp oil, and other contaminants from an oil-in-water emulsion produced in a metal working process, the filter aid comprised of:
 - a cellulosic material; and
 - an cationic polymer flocculating agent.
- [c2] 2. The filter aid set forth in claim 1, wherein the cellulosic material is a powdered cellulose fiber.
- [c3] 3. The filter aid set forth in claim 1, wherein the cationic polymer flocculating agent is a cationic amine or imine salt polymer.
- [c4] 4. The filter aid set forth in claim 3, wherein the cationic amine or imine salt polymer is one selected from a group consisting of poly[oxyethylene(dimethylimino)ethylene(dimethylimino)ethylenedichloride, polydimethylallyl ammonium chloride, and tetraalkyl quaternary ammonium chloride.
- [c5] 5. The filter aid set forth in claim 1, wherein the ratio of cellulosic material to cationic polymer flocculating agent in the filter aid is between approximately 5:1 and 30:1.

[c6] 6. A method for removing metal particles, tramp oil, and other contaminants from an oil-in-water emulsion produced in a metal working process, the method comprising the steps of:

- supplying a filter aid comprised of a cellulosic material and a cationic polymer flocculating agent to the oil-in-water emulsion;
- allowing the filter aid to react with the oil-in-water emulsion for a predetermined amount of time in order to form a floc therein;
- passing a flow of the oil-in-water emulsion through the filter aid and a filter sheet in order to filter the floc and other contaminants from the oil-in-water emulsion; and
- collecting filtered oil-in-water emulsion from the filter aid.

[c7] 7. The method set forth in claim 6, further comprising the step of supplying an acid material to the mixture of the oil-in-water emulsion and the filter aid after a predetermined pressure drop is detected across the filter sheet.

[c8] 8. The method set forth in claim 7, wherein the acid material is one selected from the group consisting of sulfuric acid, salicylic acid, fumaric acid, and citric acid.

- [c9] 9. The method set forth in claim 7, wherein the acid material is approximately 0.1 wt% citric acid.
- [c10] 10. The method set forth in claim 6, wherein the cellulosic material is a powdered cellulose fiber, and the cationic polymer flocculating agent is a cationic amine or imine salt polymer.
- [c11] 11. The method set forth in claim 6, wherein the ratio of cellulosic material to cationic polymer flocculating agent in the filter aid is between approximately 5:1 and 30:1.
- [c12] 12. The method set forth in claim 6, wherein the predetermined amount of time is between approximately 1 and 15 minutes.
- [c13] 13. The method set forth in claim 7, further comprising the step of supplying dilute sodium hydroxide solution to the filter aid formed on the filter sheet after the acid material supplying step.